

Separation and Purification Sciences Division

3M™ Micro-Klean™ RT Series™ Filter Cartridge All-Polypropylene Rigid Thermal Bonded Filters

Advancing depth filtration through technological innovation.

Micro-Klean filter cartridge, manufactured using 3M Purification's rigid extrusion bonded technology, are all-polypropylene depth filter cartridges offering premium features including:

- Consistent particle reduction efficiencies throughout the filter's life
- Increased surface area for extended filter life
- Low initial pressure drop for enhanced flow
- High particle reduction efficiencies at high flow rates (flux)

The filter's extended service life results in fewer filter change-outs while its enhanced flow characteristics can typically reduce the number of filters required to achieve a given flow rate. These combined features of Micro-Klean filter cartridges can significantly reduce total filtration costs.

Consistent filtration

The Micro-Klean filter cartridge manufacturing process combines the excellent process control with the quality assurance enabled by an ISO 9001 certified quality system to provide consistent product performance. 3M's manufacturing process provides a high degree of fibre-to-fibre thermal bonding, without the use of binders, to produce a rigid, core-less, filter structure with the following properties:

- Does not unload contaminants with increasing differential pressure like typical meltblown filters
- Allows grooves to be machined into the upstream surface, without tearing or melting the filter structure, providing more than double the effective surface area
- Exhibits exceptionally low differential pressure for a given filter rating

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Consistent filtration throughout the service life of a depth-style filter depends on how well the filter's structure tolerates fluctuations in operating conditions — including contaminant loading and differential pressure. Flexible structures, such as those found in typical meltblown and string-wound filters, tend to compress and change porosity with increased pressure, while rigid structures do not (Photo 1). Media compression can result in short filter life because the pores collapse and ultimately close.

Media compression can also cause the filter to release already held particles. The robust Micro-Klean filter cartridge captures and retains contaminant within its rigid filter matrix, even under increasing differential pressure. In addition, the unique depth filter structure of the Micro-Klean filter cartridge provides a significant increase in contaminant holding capacity and provides greater flow capacity at a given pressure.

Unlike soft meltblown and string-wound filters that require core support, the Micro-Klean filter cartridge is self-supporting and is grooved to provide greater than twice the surface area. The increase in surface area prevents premature blinding of the outer surface by large particles and gels and promotes fuller utilization of the depth-matrix. The result is significantly longer life than competitive cartridges.

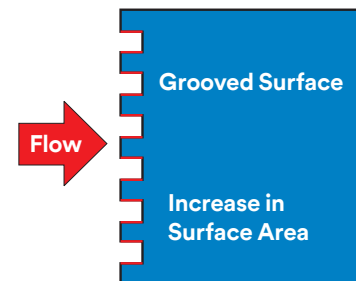
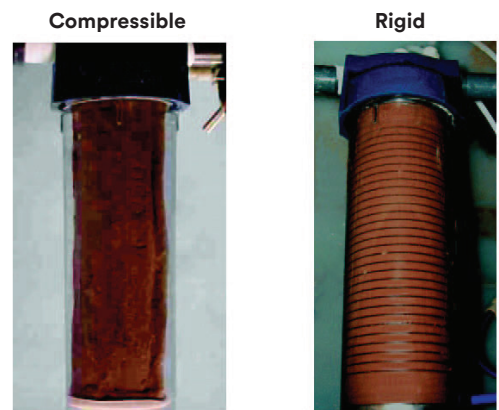


Photo 1. Compressible vs Rigid Structures @ 35 psid



Features and Benefits

Rigid depth filter construction

- Reduces unloading at high differential pressure
- Efficient reduction of deformable materials
- Consistently superior particle reduction throughout filter life and at high flow rates (flux)

Enhanced contaminant holding capacity

- Fewer filter change outs
- Long filter life

Grooved cartridge with extended surface area

- Promotes fuller utilization of the depth-matrix
- Long filter life

All-polypropylene construction

- Compatibility in a wide range of applications and operating conditions
- No adhesives, binders, surfactants, lubricants

Applications

Industrial	Plating, Desalination plants, Pulp and paper, Additives, Process cooling water, Parts Washing, Peroxide, Mechanical seals
Coatings	Resin manufacturers (water and solvent), Trade and architectural paint, Ink
Food and Beverage	Bottled water, Ready-To-Drink Beverages, Soft Drinks, Juice
Oil and Gas	Amine and glycol, Prefiltration in waterflood, Process cooling water, Completion fluid
Chemical	PE-PP, Intermediate grade chemicals, PVC-VCM, Herbicides, Pesticides
Electronics	Printed Circuit Boards, CMP slurries, Electronic Capacitors, Video Displays, Pre-RO, CD/DVD

Consistent Reduction Efficiency

The rigid Micro-Klean filter cartridge structure resists deformation, filter by-pass, compression, and particle unloading. This allows Micro-Klean filter cartridge to achieve excellent filtration efficiency up to its recommended change-out pressure (35 psid), while typical melt blown and wound structures exhibit significant drops in reduction efficiency at much lower differential pressures (10 psid).

Micro-Klean Filter Cartridge System Sizing

To size a system of Micro-Klean filter cartridge, flow vs. differential pressure data is provided in Table 2.

To calculate filter's clean pressure drop for Newtonian fluids, use the following formula in conjunction with the Specific Pressure Drop Values. The Specific Pressure Drop values may be effectively used when three of the four variables (Viscosity, Flow, Differential Pressure, and Cartridge Grade) are set. Care must be taken when sizing Micro-Klean filter cartridge systems. Select a filter housing that will accept at least the required number of 10 inch filter elements, and verify that the total system flow does not exceed the maximum housing flow rating.

Table 2. Micro-Klean filter cartridge Specific Pressure Drop (SPD)

Nominal Rating (µm)	Specific Pressure Drop per 25.4 cm (10") Filter (psid/gmp-Cp)	Specific Pressure Drop per 25.4 cm (10") Filter (mbar/lmp-Cp)
1	0.073	1.330
5	0.042	0.765
10	0.025	0.455
25	0.015	0.273
50	0.010	0.182
75	0.006	0.109

$$\frac{\text{psid [mbar]}_{\text{clean}}}{\text{clean}} = \frac{\left(\text{total system gpm [lpm]} \right) \left(\text{viscosity in Cp} \right) \left(\text{SPD value from Table 2} \right)}{\left(\text{equivalent number of 10 inch cartridges in housing} \right)}$$

3M™ Micro-Klean™ RT Series Filter Cartridge Specifications

Table 3. Micro-Klean filter cartridge Specifications

Construction	
Filter Media, End Connector	Polypropylene
Gaskets and O-ring Options (see ordering guide)	Silicone, Fluorocarbon, EPR, Nitrile, and Polyethylene
Operating Conditions	
Maximum Operating Temperature	80°C (176°F)
Maximum Differential Pressure	1.0 bar @ 80°C (15 psid @ 176°F) 1.7 bar @ 60°C (25 psid @ 140°F) 4.1 bar @ 20°C (60 psid @ 68°F)
Recommended Change-out Differential Pressure	2.4 bar @ 20°C (35 psid @ 68°F)
Cartridge Dimensions	
Inside Diameter (nominal)	28 mm (1.1")
Outside Diameter (nominal)	66 mm (2.6")
Length (nominal) see ordering guide	248 - 1016 mm (9 ¾" - 40")
Regulatory	
Materials used in the manufacture of Micro-Klean RT series filters meet the requirements of USFDA 21 CFR for food and beverage contact Micro-Klean RT series filters have been certified to NSF/ANSI Standard 42 and 61.	

Chemical Compatibility

The 100% polypropylene construction provides excellent chemical compatibility in many demanding process fluid applications. Compatibility is influenced by process operating conditions. Micro-Klean filter cartridge should be tested under actual conditions to determine compatibility.

Table 4. Fluid Compatibility

Chemical	Temperature	Chemical	Temperature	Chemical	Temperature
Acetic Acid 20%	71 °C (160 °F)	Hydrogen Peroxide	38°C (100°F)	Sodium Carbonate	71°C (160°F)
Alkanolamines	60 °C (140 °F)	Methyl Ethyl Ketone	21°C (70°F)	Sodium Hydroxide 70%	71°C (160°F)
Ammonium Hydroxide 10%	71 °C (160 °F)	Mineral Oil	21°C (70°F)	Sulfuric Acid 20%	71°C (160°F)
Beach 5.5%	49 °C (120 °F)	Nitric Acid 20%	49°C (120°F)	Sulfuric Acid 70%	71 °C (160°F)
Ethylene Glycol	71 °C (160 °F)	Potassium Hydroxide	60°C (140°F)	Urea	71°C (160°F)

Application Engineering

3M has a global team of market-focused scientists and engineers who excel in supporting and collaborating with end-users. Our technical teams are skilled in performing on-site bench-scale or in-house tests, and relating results to full scale manufacturing operations and optimizing cost of purification. When unique processing problems are encountered, our product and application specialists are equipped to identify solutions using either 3M's broad array of existing products or potentially develop a custom solution for your application.

3M Filter Housings

3M Purification manufactures a full line of industry standard filter housings to meet most application requirements. Models are available for both gas and liquid service in a wide range of construction materials, from plastics to ASME Code with 316L stainless steel, to suit a variety of application needs. For more information about 3M filter housings, consult your local 3M distributor.

3M™ ES Series Filter Housing: the 3M ES series filter housing is a durable high volume filter housing constructed from 316L stainless steel or carbon steel. With a cartridge capacity from 12- to 480- 25.4 cm (10 in) filter elements, the 3M ES filter housing can accommodate a wide range of flow requirements.

3M™ AL and 3M™ CT Series Filter Housings: 3M AL series and 3M CT series filter housings offer a wide range of sizes from one cartridge to eighteen cartridges.

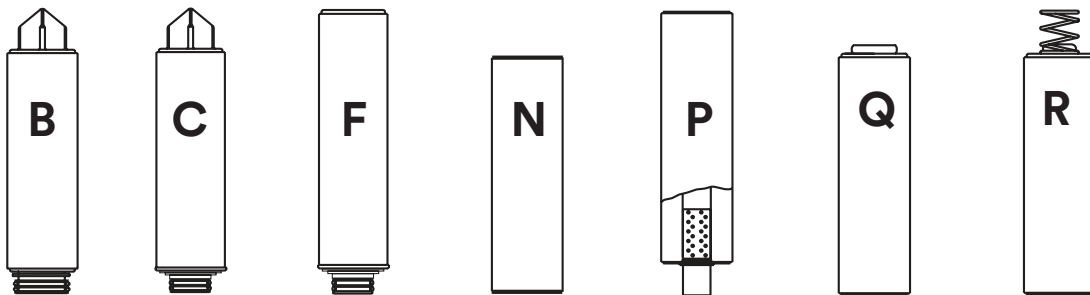
3M™ DC and 3M™ SS Series Filter Housings: 3M DC and 3M SS series filter housings offer a low cost alternative for low volume filtration. Constructed from reliable 304L stainless steel (Model 3M DC) or 316L stainless steel (Model 3M SS), these housings are available for a wide range of flow rates and applications.

Micro-Klean filter cartridges are available for use in a CUNO™ CTG-Klean Filter System. This unique system design provides a totally enclosed system using separate pressure vessel and filter pack to isolate process fluid from housing. This system generally reduces the clean-up costs involved with filter change-out while protecting the work environment and the operator from exposure to the process fluid. Ask your local 3M Purification distributor for more information.

3M™ Micro-Klean™ RT Series Filter Cartridge Ordering Guide

Cartridge Type	Length	Grade	Material	Surface	Packaging	Ring Support	End Modification	Gasket/O-ring
3M™ Micro-Klean™ RT Series Filter Cartridge	09 – 24.8 cm (9 ¾")*	Y – 1 µm	16 – Polypropylene	G – Grooved	2 – Bulk	0 – None	B-226 O-ring and Spear	A-Silicone
	10 – 25.4 cm (10")	B – 5 µm					C-222 O-ring and Spear	B-Fluorcarbon
	19 – 49.5 cm (19 ½")*	C – 10 µm					F-222 O-ring and Flat Cap	C-EPR
	20 – 50.8 cm (20")	F – 25 µm					N-None	D-Nitrile
	29 – 74.3 cm (29 ¼")*	L – 50 µm					P-Polypropylene	N-None*
	30 – 76.2 cm (30")	Q – 75 µm					Core Extender	
	39 – 99 cm (39")						Q-Cap without Spring	
40 – 101.6 cm (40")		R-Cap with Spring						

*Available with N, P, Q, or R end modifications only.



This Micro-Klean RT series filter is tested and certified by NSF International against NSF/ANSI Standard 42 For Material Requirements Only**.



This Micro-Klean RT series filter is tested and certified by WQA against NSF/ANSI Standard 61 For Material Requirements Only**.

**For End Treatment "P" consult factory.

Please note: The Order Guide above is for reference only. Not all combinations are available.

Please consult with your 3M representative to determine the appropriate part number for your application.

Product Selection and Use:
Many factors beyond 3M's control and uniquely within user's knowledge and control can affect the use and performance of a 3M product in a particular application. As a result, customer is solely responsible for evaluating the product and determining whether it is appropriate and suitable for customer's application, including conducting a workplace hazard assessment and reviewing all applicable regulations and standards (e.g., OSHA, ANSI, etc.). Failure to properly evaluate, select, and use a 3M product and appropriate safety products, or to meet all applicable safety regulations, may result in injury, sickness, death, and/or harm to property.
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